INFECTION PREVENTION & CONTROL PROGRAM

HEALTHCARE ASSOCIATED INFECTONS

PRELIMINARY REPORT

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I. SUMMARY

The Healthcare Reform Act of 2006 required that the Department of Public Health (DPH)[1] "implement a proactive statewide infection prevention and control program . . . in licensed health care facilities following protocols of the Centers for Disease Control and Prevention (CDC) for the purposes of implementation and adherence to infection control practices. . ." In partnership with the Betsy Lehman Center for Patient Safety and Medical Error Reduction (BLC), DPH created a program for the prevention and control of healthcare associated infections (HAI) in acute care hospitals.

The goal of the program is to reduce the incidence of those infections acquired in acute care hospitals. Each of the following contributes to the goal.

1) *Reports of Outcome Measures* help hospitals benchmark their performance against a national norm and provide greater transparency to the public and other stakeholders.
2) *Evidence Based Best Practices* promote optimal infection prevention and control programs for use by hospitals.
3) *Professional Education* provides healthcare professionals with current knowledge and a forum for the sharing of best practices.
4) *Public Awareness* campaigns inform the pubic of what they can do to prevent infections.

The program is responsive to legislative mandates and to recommendations of the Health Care Quality and Cost Council (HCQCC), chaired by Dr. JudyAnn Bigby, Secretary of Health and Human Services. The HCQCC established specific goals and milestones including the first aggregate report be completed by March of 2009. This preliminary report covers a period from July 1, 2008 to October 31, 2008.

Sixty six of Massachusetts' 74 acute care hospitals are represented in the report. Most of the hospitals are non-teaching hospitals. Acute care hospitals in Massachusetts range in size from fewer than 100 beds to more than 300 beds. See Appendix 1 for a list of all acute care hospitals in the state. Hospitals reported their data through the National Healthcare Safety Network (NHSN), which is the surveillance system developed by CDC.

The infection measures in this report were recommended by an Expert Panel organized at the inception of the program and was chosen on the basis of frequency, severity and preventability. The first public report presents data on central venous catheter associated bloodstream infections (CVC-BSI) for patients in intensive care units, (ICU) and on deep surgical site infections (SSI) arising from knee and hip arthoplasty.

Hospitals collect data on other measures that are not being made public at this time. These are measures whose definitions and/or methodology need further assessment to determine if they are accurate and useful for public reporting. Some of these measures are reported to BLC. Additional measures are being reported only within hospitals for their own internal quality monitoring. See Appendix 2 for a chart of all infections being monitored and the status of reporting.

Hospitals are collecting race and ethnicity data based on Massachusetts' expanded list of codes. The data are collected through NHSN, but hospitals are using custom fields to enter the data. Race and ethnicity data are not available for this report because the custom fields were recently created and therefore were not collected during this reporting period. DPH plans to report these data in the October, 2009 report.

Sixty-six acute care hospitals reported data on CVC-BSIs. During the reporting period, these hospitals reported a total of 50 criterion 1 CVC-BSIs in their adult and pediatric ICUs. The 5 hospitals reporting data from neonatal ICUs (NICU), reported 6 CVC-BSIs. . Finally, hospitals reported a total of 7 SSIs arising from total primary knee arthroplasty and 10 SSIs resulting from total or partial primary hip arthroplasty.

In addition to the reporting of specific measures of infection, DPH and BLC have initiated other activities related to the prevention of HAIs. John Snow Research and Training Institute (JSI) is the primary contractor for the program, with staff experienced in infection prevention activities. JSI provided resources for the production of the Expert Panel's final report as well as expertise for many aspects of data collection and analysis. JSI conducted a methicillin-resistant *Staphylococcus aureus* (MRSA) point prevalence survey in September 2008 to determine the extent of MRSA infection and colonization in acute care hospitals. A second point prevalence study is planned for the fall of 2009 to validate results and measure progress. JSI is also collecting data on influenza vaccination of

[1] The Bureau of Disease Prevention Response and Services (BIC) and the Bureau of Health Care Safety and Quality (BHCSQ) who contributed to the program are part of the Department of Public Health.

hospital employees for October 2008 through March 2009. The MRSA and vaccination data is being reported to BLC.

The Division of Healthcare Quality (DHCQ) within DPH employs two nurses who are experienced infection preventionists. They developed a tool to assess infection prevention programs in acute care hospitals. They have completed visits to 50% of the hospitals. These visits provide information in areas where the hospitals may have need of consultation.

As of October, 2008, Massachusetts is one of 25 states that require mandatory public reporting of HAIs. Nineteen of these states are using NHSN. Hospitals have been learning how to collect data using standardized definitions they may not have used before. NHSN is new to most hospitals so they are becoming familiar with different system requirements. These challenges have led to initial data problems. None-the-less, the advantages of NHSN outweigh these challenges in terms of its long-term development as an application, its use of consensus definitions and its ability to provide benchmarks of performance from other states.

This report covers 4 months of data collection. Since the time period is short and technical difficulties with NHSN have been encountered, the numbers are small and great care must be taken with interpretation. Some comparisons to the NHSN national published data are presented. The national data represents a very much larger sample of hospitals and events observed over two years. As additional data are collected and analyzed, there will be ample opportunity for more in-depth analysis and comparisons.

The next public report is planned for October, 2009. That report will include hospital specific information on CVC-BSIs and SSIs. It is expected that the October report will also present aggregate data for: criterion 2 CVC-BSIs (skin contaminants), abdominal and vaginal hysterectomy SSIs, and SSIs resulting from coronary artery bypass grafts (CABG) surgery. If the number of events is large enough, data will be stratified by race and ethnicity. Additionally, aggregate data will be presented for the influenza vaccination of hospital employees and possibly for the MRSA prevalence studies.

The report also contains sections on NHSN, Lessons Learned and Future Plans. The section on NHSN includes issues related to NHSN adoption and implementation. The Lessons Learned section discusses issues related to the process of developing the program. The Future Plans section discusses the October report and longer term activities of the program.

II. BACKGROUND

Healthcare reform (Chapter 58 of the Acts of 2006) required that DPH develop a healthcare associated infection prevention and control program to reduce HAIs. HAIs are a cause of preventable illness and death. It is estimated that 2 million patients develop one or more HAIs resulting in 90,000 deaths annually.[2] In addition to the legislative mandate, consumer groups have also called for mandatory public reporting of HAIs.

In order to implement the program, DPH, BLC and BID convened a panel of experts including hospitals, academia, organizations, professional associations and consumer advocacy. The Expert Panel's charter was the development of a comprehensive program in accordance with the Healthcare Reform Act.

The Expert Panel issued a final report[3] in January, 2008 and recommended that the program begin with acute care hospitals and recommended outcome measures, evidence based best practices and data reporting requirements. The Panel further recommended that outcome and process measures be reported in three tiers so that measures with poorly defined definitions and/or unresolved methodology issue could be examined prior to public release. See Appendix 2.

The reporting tiers are:

1. DPH – public data for use by consumers, insurers and stakeholders
2. BLC – data for monitoring and quality improvement purposes, but not initially publicly disseminated pending assessment of the adequacy of definitions and methodology
3. Internal – data for tracking performance.

The Panel also recommended that data be reported through the NHSN created by the CDC. NHSN provides uniform definitions and a national database for comparison purposes.

Following up on these recommendations, DPH amended hospital licensure regulations 105 CMR 130.000 in February, 2008. The regulation established NHSN as the platform for data collection and submission, required hospitals grant separate and specific access to the data to DPH and BLC, set deadlines by which these elements needed to be accomplished and required hospitals follow DPH guidelines. By April of 2008, all hospitals had enrolled in NHSN and in July, 2008 hospitals began submitting data.

While the outcome measures provide one kind of information, the best practices recommended by the Expert Panel provide information about the prevention of infection. JSI, the program contractor, conducted an extensive literature review to compile a list of best practices. The Expert Panel then ranked each on strength of evidence and strength of the recommendation. There are a total of 324 best practices falling into one of eight categories. The number in parenthesis is the number of best practices for that category.

1. Hand Hygiene (27)
2. Standard Precautions (34)
3. Contact Precautions (10)
4. Environmental Measures for Prevention and Management of multi-drug Resistant Organisms (8)
5. Prevention of Ventilator-Associate Pneumonia (20)
6. Prevention of Surgical Site Infections (52)
7. Prevention of Bloodstream Infections (103)
8. Prevention of Catheter-Associated Urinary Tract Infections (40)

The scope and content of current hospital programs provide a context for understanding outcome measures and best practices. In this vein, JSI developed a survey to look at hospital characteristics, surveillance activities, prevention activities and data capacity. Sixty eight hospitals responded to the survey. Information specific to CVC-BSIs and SSIs are included in those specific sections.

Of the hospitals responding to the survey, the largest proportion of hospitals (56%) were non-teaching community hospitals, the second largest (38%) community teaching hospitals and the remainder university hospitals. The average bed size is 229 with the largest, 621 beds, in a university teaching hospital and the smallest (150) beds in a non-teaching community hospital. All but one hospital have ICUs with a mean of 25 ICU beds. Almost half of the hospitals had medical residents in training and 97% had nursing students.

[2] Burke, JP. (2003). Infection Control – A Problem for Patient Safety. New England Journal of Medicine 13:348(7):651-6

[3] The Final Report can be found at www.mass.gov/dph/dhcq.

All hospitals perform internal surveillance for blood stream infections, surgical site infections and MRSA. Most hospitals were involved in special initiatives to decrease BSIs and SSIs. Ninety one percent had initiatives to reduce BSIs and 97% had activities related to reducing SSIs.

JSI also conducted focus group interviews with hospital executives for additional insights. Primary concerns and program elements to address them are:

HOSPITAL CONCERNS	PROGRAM ELEMENTS
Uniformity of data collection and consistent use of definitions	NHSN requires uniform data collection and standardized definitions
Inaccurate comparisons between hospitals	The CVC-BSI data is stratified by type ICU. The SSI data will be stratified when the sample is larger.
Accountability for preadmission infections	NHSN definitions include a time frame for measuring the onset of an infection.
Burden of data collection	This is data that for the most part hospitals are already collecting, but DPH is aware of the burden.
Public understanding of the data	The report is written to serve the needs of multiple constituencies.
Focus on prevention	DPH is making visits to each hospital to provide education and consultation.

In addition to the support that JSI provided, DPH formed partnerships with the Coalition for the Prevention of Medical Errors and the Partnership for Healthcare Excellence. The Coalition has held a number of seminars for professionals on infection prevention and for the sharing of effective strategies. The Partnership has provided a fact sheet to raise public awareness and address the steps they can take to reduce infection. The fact sheet has also been translated in Spanish. Stakeholders from associations and organizations involved with HAIs have also been involved.

Following the completion of the Expert Panel's work, DPH and BLC convened a Technical Advisory Group (TAG), consisting of members with expertise in infection prevention, patient safety and healthcare policy. This group's charter is to provide DPH, BLC and BID with advice on data analysis and interpretation. For example they reviewed the early MRSA data and suggested that repeating the survey would be important to an analysis of the data. The TAG will have an on-going role as additional reports are prepared.

III. FINDINGS

Findings are preliminary in that only four months of data have been collected and analyzed, some hospitals are excluded from the report, the follow-up periods for observing HAIs have not expired and all of the data have not been validated. The small number of events, over a short space of observation time, demands cautious interpretation. Raw numbers and rates of infections are presented for each infection type. For CVC-BSI infections, rates of catheter utilization were similar to national rates, and are not reported here.

A total of 66 hospitals are represented in this report. The sample includes both teaching and non-teaching hospitals. Bed size varied with 42 hospitals with a bed size of less than 200, 10 hospitals had a bed size of between 201 and 300 and the remainder (14) had greater than 300 beds. Five of the hospitals reported NICU CVC-BSI data.

A. Central Venous Bloodstream Infections

Central venous catheters are inserted into one of the great vessels (e.g., sub-clavian vein, jugular vein) that terminate at or close to the heart. A criterion 1 CVC-BSI is defined as occurring for the duration of catheter placement and for 48 hours thereafter, caused by a recognized pathogen cultured from one or more blood cultures and the cultured organism is not related to an infection at another site. This report focuses on criterion 1 CVC-BSIs that occur in Intensive Care Units (ICUs) -- the majority of temporarily inserted catheters are in ICU patients who are closely monitored.

Over the four month reporting period, 50 criterion 1 CVC-BSIs were identified in pediatric and adult patients. One event was excluded from the rate due to missing denominator data. Seven occurred in one pediatric cardiothoracic surgical ICU and were not aggregated with the larger number of pediatric ICU cases to be consistent with the national database. The remaining 42 cases occurred across 16 hospitals. Nine of the patients died, however CVC-BSI was implicated in any of the deaths. Five hospitals reported a total of 6 NICU CVC-BSIs with 2 deaths, of which 1 was attributable to the infection. See Appendix 3 for a list of pathogens.

Tables 1shows data on CVC-BSI infection rates s for adult and pediatric ICUs. The tables are stratified by type of ICU. Rates provide a means of comparing infections across facilities, while stratification by type ICU provides some adjustment for interpretation by patient type and acuity. To match the CDC methods, avoid small number effects and to report the maximum amount of data, the location types pediatric medical ICU and pediatric medical/surgical ICU were merged into the location type “Pediatric ICU”. The locations surgical ICU, trauma ICU, burn ICU and neurosurgical ICU were merged into location type “Surgical and Trauma ICU”.

For comparison to the national data, pediatric medical/surgical ICU was used as a comparison for the “pediatric” combined ICU. The mean was calculated for comparison to the “Surgical/Trauma” ICU because these categories were disaggregated by hospital teaching type in the CDC report.

CVC-BSI rates are calculated by using the aggregate number of cases divided by the aggregate number of days of central line insertion multiplied by 1000. Central line days (utilization of a central line) are an indication of patient acuity and level of utilization. Patients who have had a catheter inserted for a longer period of time tend to be sicker. For adult patients, the highest rate was observed in Medical ICUs with a rate of 1.6 per 1000 line days. The lowest rate was observed in Surgical and Trauma ICUs with a rate of 0.3. Pediatric ICUs had a rate of 1.8.

Infection rates and utilization ratios for Massachusetts are compared to national NHSN published data for 2006-2007.[4] Both the national “pooled mean”, calculated by using the aggregate number of cases reported nationally divided by the aggregate number of central line days multiplied by 1000 and the national “median”, representing the rate in 50% of the NHSN national ICUs in the category of ICU, are provided. Rates are based on a very small number of events over the short period of observation, so care must be taken in interpretation.

[4] Edwards JR, Peterson KD, Andrus ML, Dudeck MA, Pollock DA, Horan TC; National Healthcare Safety Network Facilities. National Healthcare Safety Network (NHSN) Report, data summary for 2006 through 2007, issued November 2008. Am J Infect Control 2008; 36: 609-26.

TABLE 1
CENTRAL VASCULAR LINE BLOODSTREAM INFECTION RATES
MASSACHUSETTS (7/1/08-10/31/08) & NATIONAL NHSN DATA (2006-2007)

ICU TYPE	NO. OF ICUs	NO. OF CRITERION 1 CVC-BSI	CVC DAYS	MA CRITERION 1 CVC-BSI RATE*	MA ALL CVC-BSI RATE	NATIONAL RATE (MEAN)	NATIONAL RATE (MEDIAN)
Coronary ICU	12	2	5101	0.4	1.0	2.1	1.3
Cardiothoracic ICU	10	4	7427	0.5	0.5	1.4	1.2
Medical ICU	15	17	10950	1.6	2.0	2.4	1.9
Medical/Surgical ICU	46	9	15702	0.6	0.6	1.7	***
Surgical and Trauma ICU**	20	5	14460	0.3	1.2	2.1	***
Pediatric ICU	7	5	2784	1.8	2.9	2.9	2.1

CVC-BSI rate= Number of CVC-BSI/Number of central line days x 1000
*Combination of criterion 1 CVC-BSI's and all others reported by Massachusetts' hospitals to NHSN allow for comparison with national rates (criteria 2 and 3 CVC-BSI are recorded, but not individually publicly reported at present).
**Combined ICU types (Surgical, Trauma and Burn).
***Median rates are not available from the national data due to how the data is disaggregated in the national reports.

Tables 2 and 3 present NICU rates by birth weight. Birth weight is used to stratify babies in the national data, but it should be recognized that babies may be admitted to NICUs, particularly tertiary care referral hospitals, well after birth.

Table 3 presents the rate of infection (the total number of infections divided by central line days multiplied by 1000) for criterion 1 CVC-BSIs in NICUs. The rates for all CVC-BSIS (criteria 2 and 3 in addition to reportable criterion 1) are combined for comparison with national data. National data provided for comparison is for level III NICUs, while state data is a combination of mostly level III and some level II/III NICUs.

TABLE 2
CENTRAL VASCULAR CATHETER BLOODSTREAM INFECTIONS IN NICUs
MASSACHUSETTS (7/1/08 – 10/31/08) & NATIONAL NHSN DATA (2006 – 2007)

BIRTH WEIGHT	NO.OF NICUs	NO. OF CRITERION 1 CVC-BSIs	CVC DAYS	CRITERION 1 CVC-BSI RATE	MA ALL CVC-BSI RATE*	NATIONAL RATE (MEAN)	NATIONAL RATE (MEDIAN)
<= 750 g	5	2	650	3.1	4.6	3.7	2.3
751-1000 g	5	2	563	3.6	3.6	3.3	2.4
1001-1500 g	5	1	561	1.8	1.8	2.6	1.6
1501-2500 g	5	0	477	0.0	0.0	2.4	1.1
>2500 g	5	1	354	2.8	8.5	2.0	0.0

CVC-BSI rate = number of CVC-BSI /number of central line days/central line days x 1000.
*Combination of criterion 1 CVC-BSI's and all others reported by Massachusetts' hospitals to NHSN allow for comparison with national rates (criteria 2 and 3 CVC-BSI are recorded, but not individually publicly reported at present).

Appendix 4 has additional tables with CVC-BSI percentiles which allow individual hospitals to compare their rates by ICU type to the group of Massachusetts hospitals reporting.

B. Surgical Site Infections

This report includes surgical site infections (infection of the deep tissue/prosthesis), following primary knee and hip arthroplasty (replacement of the joint with an artificial knee or hip). Such infections may cause readmission to the hospital. The definition for these SSIs includes a follow-up of one year. Surgical procedures for which infections are reported here occurred over the space of 4 months, so the longest follow-up is 4 months. Thus, these infection rates would be low, as only less than 4 months and not the year of observation for infection were

completed. This will also be true of the October, 2009 report as almost all of the knee and hip replacements will not have had 1 year of follow-up.

Seven cases of deep SSIs were found following knee arthroplasty and 10 cases following hip arthroplasty. No deaths occurred in any of these patients. The data are not stratified to adjust for risk since the numbers are small. Also, because of the small sample, a comparison to the national data is not possible.

Table 5
DEEP & ORGAN SPACE SURGICAL SITE INFECITON RATES

SURGERY	NUMBER OF DEEP & PROTHESIS SSIs	NUMBER OF PROCEDURES	MASSACHUSETTS RATE PER 100 PROCEDURES
Knee arthroplasty	7	5328	0.131
Hip arthroplasty	10	4023	0.249

The SSI rate is calculated by dividing the number of infections by the number of procedures multiplied by 100.

IV. THE NATIONAL HEALTHCARE SAFETY NETWORK

NHSN is a secure, integrated, web-based monitoring system established by the CDC for hospitals to report HAI information confidentially. There is no charge for the use of the system. Definitions for data collection are standardized and internationally recognized. Participation in NHSN allows facilities to monitor HAI data internally, compare themselves to similar institutions and to measure their results against a benchmark. DPH, BLC, BIC can do likewise with explicit permission from hospitals. This information is used to guide quality improvement aimed at reducing HAIs.

Key features of NHSN include:

- Confidentiality of the data is guaranteed by CDC; state agencies are able to view and analyze data only after hospitals provide access using the NHSN group feature.
- Participation in NHSN requires facilities to agree to follow specific CDC HAI protocols and definitions. Facility specific data is immediately available to hospitals, NHSN, and government agencies for viewing and analysis.
- Hospitals are authorized to view only their own facility specific information.
- NHSN has optional custom fields used for unique requirements that states may have, such as Massachusetts' race and ethnicity coding.
- NHSN provides initial and on-going training and technical assistance for hospitals on enrollment, data collection and submission.
- CDC formed an NHSN user group that provides technical support and training for state users.
- NHSN collaborates with other organizations focused on promoting scientifically accepted principles of infection prevention (i.e. Society of Healthcare Epidemiology of America, Association for Professionals in Infection Control and Epidemiology, Inc., Infectious Disease Society of America, etc.).
- Maintenance of the NHSN site and upgrades to the system are provided by CDC with no cost to users.
- NHSN routinely publishes reports of national aggregated HAI data.

Challenges associated with NHSN include:

- Enrollment was labor intensive and required that facilities complete a multi-step process.
- Among the steps that proved particularly cumbersome was the granting of access rights to DPH and BLC so that they could view the data.
- The system is inefficient in that it requires long waits between tasks. NHSN also has outages that CDC is working to correct.
- Hospitals with electronic data collection experienced varying degrees of difficulty aligning their system with NHSN.
- NHSN does not include a process to validate the accuracy of data submitted, though checks for agreement among data elements have recently been built in.

V. OTHER ACTIVITES

While the public reporting of acute care hospital data has had precedence, DPH and BLC have initiated other activities to advance the goal of producing a comprehensive Infection Prevention and Control Program.

A. MRSA Point Prevalence

JSI conducted a MRSA point prevalence study to determine the number of MRSA infection and colonization in acute care hospitals on a single day. DPH and BLC are planning a second point prevalence study to enhance the utility of the findings after which time aggregate data will be reported.

B. Influenza Vaccinations of Hospital Employees

JSI also conducted a survey of influenza vaccinations administered to hospital employees for the influenza season that runs from November 2009 through March 2009. It included all employees (direct care, administrative and environmental workers). The data were collected for those immunizations hospitals administered with an optional reporting of vaccinations received outside of the hospital program. DPH and BLC are planning on aggregate reporting in October.

C. Assessment Visits

Two infection preventionists in the Division of Healthcare Quality developed a tool that enables acute care hospitals to conduct assessments of their own infection programs. The intent is to aid hospitals in understanding the spectrum of programmatic components, policies and procedures in their own operations. The assessment is based on 20 of the best practices recommended by the Expert Panel. The preventionists are working with hospitals as partners in implementing these best practices.

The preventionists first send a questionnaire (the tool) to hospitals for completion and then follow-up with an on-site visit. The site visits provide an opportunity to confirm information and provide hospitals with education about optimal infection prevention practices. The tool and visits are for the purpose of assessment only and are not a compliance survey.

The Assessment Tool provides guidance in the following areas:

1. Priorities: general question about significant program elements
2. Infection Prevention Committee: composition, meeting frequency and information dissemination
3. NHSN: problems and/or questions about the software used for reporting infections
4. MRSA Point Prevalence: questions about the study[5]
5. Process Measures: processes related to surgical site infections, central lines, hand hygiene and ventilator associated pneumonia
6. Surveillance: procedures related to tracking infections
7. Department Resources: staffing levels
8. Education: competency of staff, information for patients and families
9. Isolation Precautions: approaches to identify patients requiring isolation
10. Environment: equipment and room cleaning.

D. Other Facility Types

Under the umbrella of the HCQCC, DPH and BLC have expanded the scope of the program to include 3 other types of facilities. They are: ambulatory surgical centers, extended care (long-term care, long-term acute care and rehabilitation hospitals) and dialysis centers. The same process used in acute care hospitals are being applied to these facilities, though in a more limited way. All groups have met at least once and have established on-going meeting schedules. Each group will:

1. Identify those best practices relevant to their patient/resident population
2. Identify outcome measure(s)
   Each group has preliminarily identified collecting the number of employees vaccinated for influenza as one outcome measure.
3. Discuss technical training and professional education needs
4. Discuss public awareness campaigns.

E. Training and Education

[5] The first phase of data collection was completed in September, 2008. Phase 2 data collection is expected in the fall of 2009.

Training of several different kinds took place in the reporting period. The first was technical training on using NHSN, conducting the MRSA point prevalence study and conducting the employee influenza vaccination survey. The second type of training was largely done by the Coalition for the Prevention of Medical Errors. The Coalition provided professional training on best practices.

1. Technical Training
   Prior to enrolling in NHSN, all users are required to take NHSN's web based training. Facility Administrators, Group Administrators and Users (those other than Facility or Group Administrators) are required to watch an Overview of NHSN, NHSN Enrollment and Facility Start-up modules and read the NHSN Manual – Patient Safety Protocol. Additionally, all must view the specific modules for which they will be collecting data (e.g., procedure associated module). The Administrators must also view modules specific to their tasks.

   JSI provided additional training in the form of webinars to supplement the NHSN training. The webinars "walked" hospitals through the process of enrolling, obtaining a digital certificate and conferring rights. Webinars were also conducted on the unique requirements for the point prevalence study and influenza vaccination survey. An additional webinar was presented on how to implement Massachusetts requirement for reporting an expanded list of race and ethnicity codes.

2. Professional Education
   The Coalition for the Prevention of Medical Errors has conducted 14 programs between 2007 and the first part of 2009 using subject matter experts from across the country. Nine hundred participants attended these programs. Among the topics covered in these programs were: the challenge of identifying ventilator associated pneumonia, identifying and treating sepsis, choosing a surveillance system, keys to executive support and a team approach to HAIs. The Coalition also serves as a clearing house of current literature, other worthwhile programs and meeting schedules of various stakeholders. They maintain an extensive distribution list including all of the acute care hospitals in the state.

It is too early in the program's history to assess the impact that training and education might have on HAI rates. Many factors can contribute to a reduction of the incidence of HAI, among them training and education. Other factors influencing HAI rates include public reporting, hospital's own initiatives, public awareness and advances in treatment. The first step in assessing rates will be a year-to-year comparison of rates which will occur after two full years of data collection.

F. Public Awareness

The Partnership for Healthcare Excellence has created a fact sheet on hand hygiene for the public which provides helpful information about those preventive measures the public can adopt. The sheet has been translated into Spanish. The sheets have been distributed in the communities served by the Partnership and to hospitals. The Partnership estimates that it has had approximately 220 downloads from its website, many from hospitals that are customizing the fact sheets for their own use.

VI. LESSONS LEARNED

The lessons learned in the development and implementation of the program from its inception to this preliminary report is:

- Prevention and control of HAI must be embedded in an organization's overall quality and safety program.
- Support and buy-in from leadership at the highest institutional level are crucial to the implementation of HAI reporting.
- NHSN is a nationally recognized system for reporting, evaluating and comparing HAI data. While acknowledging the guidance and technical support DPH has received from NHSN, NHSN has limitations associated with the system. Entering data is resource intensive for infection preventionists and users who are required to follow NHSN rules.
- Educating healthcare personnel on the best practices for prevention of HAIs is a significant component of this initiative.
- There is variation in the ability of hospitals to use existing systems to transmit data electronically. This increases the burden of data collection.
- Many infection prevention and control departments are under-resourced, and the new reporting requirements place additional demands on infection preventionists.

VII. FUTURE PLANS

These plans represent the continuation of activities already undertaken supplemented by other ones as recommended by the Expert Panel.

- DPH will implement a system for validation consistent with protocols under development by CDC to ensure accuracy and timeliness of data submitted.
- DPH will develop a process to evaluate data submission for reliability and consistency in the application of the surveillance definitions.
- DPH will continue the ongoing collaboration with BLC, BID and additional stakeholders in the development of HAI reports which are accurate, complete and meaningful to the public, hospitals and healthcare providers.
- DPH will review and document hospital compliance with mandated reporting.
- DPH will continue to support HAI prevention and NHSN training initiatives.
- DPH will continue to look for additional ways to promote broader involvement of patients and consumer groups in this important initiative.
- DPH will consider additional methods for risk adjustment of the data to provide fair interfacility comparisons of infection rates.
- DPH will continue the expansion of the program to other facility types.
- DPH will advocate for dedicated funding and resources to support the implementation of a comprehensive, statewide Infection Prevention and Control Program.

Appendix 1
ACUTE CARE HOSPITALS IN MASSACHUSETTS

Addison-Gilbert*
Anna Jaques Hospital*
Athol Hospital
Baystate Mary Lane Hospital*
Baystate Medical Center
Berkshire Health Systems
Beth Israel Deaconess Hospital - Needham
Beth Israel Deaconess Medical Center
Boston Medical Center
Brigham and Women's Hospital
Signature Healthcare - Brockton Hospital
Cambridge Health Alliance - Cambridge Hospital
Cambridge Health Alliance - Somerville Hospital
Cambridge Health Alliance - Whidden Memorial
Cape Cod Hospital
Caritas Carney Hospital
Caritas Good Samaritan Medical Center
Caritas Holy Family Hospital
Caritas Norwood Hospital
Central New England Health Alliance
Children's Hospital
Clinton Hospital
Cooley Dickinson Hospital
Emerson Hospital
Fairview Hospital
Falmouth Hospital
Faulkner Hospital
Franklin Medical Center
Hallmark Health Corp -- Lawrence Memorial
Hallmark Health Corporation -- Melrose - Wakefield
Harrington Memorial Hospital
Heywood Hospital
Holyoke Hospital
Hubbard Regional Hospital
Jordan Hospital
Lahey Clinic Hospital
Lawrence General Hospital
Lowell General Hospital
Marlborough Hospital
Martha's Vineyard Hospital
Massachusetts Eye & Ear Infirmary
Massachusetts General Hospital
Mercy Medical Center*
Merrimack Valley Hospital
Metro West Medical Center - Framingham Hospital
Metro West Medical Center -- Leonard Morse Hos
Milford Regional Hospital
Milton Hospital
Morton Hospital and Medical Center
Mount Auburn Hospital
Nantucket Cottage Hospital*
Nashoba Valley Medical Center*
New England Baptist Hospital
Newton-Wellesley Hospital
Noble Hospital
North Shore Medical Center **
Northeast Hospital - Addison Gilbert Hospital
Northeast Hospital - Beverly Hospital
Nthern Berkshire Health Sys(Nth Adams Reg Hos)
Quincy Medical Center
Saint Vincent Hospital
Saints Memorial Medical Center
Shriner's Hospital for Children – Boston*
Shriner's Hospital for Children - Springfield
Signature Healthcare - Brockton Hospital
South Shore Hospital
Southcoast Health Systems -- Charlton Hospital
Southcoast Health Systems -- St. Luke's Hospital
Southcoast Health Systems -- Tobey Hospital
St. Anne's Hospital
St. Elizabeth's Medical Center
Sturdy Memorial Hospital
Tufts New England Medical Center
U Mass Memorial Medical Center
Winchester Hospital
Wing Memorial Hospital

*****These hospitals have been excluded from the analysis for technical reasons. Though in compliance as of 3/16/09, Anna Jacques, Mercy, Nashoba Valley, Shriners Boston are still excluded.

** Union and Salem hospitals are a part of North Shore Medical Center. They are combined in this report, but will be separated in the October 2009 report.

Appendix 2
Summary Chart of HAI-Related Measures as recommended by the Massachusetts Expert Panel, January 31st 2008

HAI Measures Approved by Expert Panel			
Outcome Measures	**Reporting Level**		
	Public [1]	**BLC** [2]	**Internal** [3]
✓ CVC-BSI in ICUs – true pathogens (CDC criterion 1)*	♦		
✓ CVC-BSI in ICUs – skin contaminants		♦	
✓ CVC-BSI outside of ICUs – true pathogens and skin contaminants (CDC criterion 1 and 2)*			♦
✓ SSI resulting from hip arthroplasty	♦		
✓ SSI resulting from knee arthroplasty	♦		
✓ SSI resulting from hysterectomy (vaginal and abdominal)		♦	
✓ SSI resulting from coronary artery bypass graft		♦	
✓ Ventilator-Associated Pneumonia (VAP)			♦
Point prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA)		♦	
Clostridium difficile-associated disease (CDAD)			♦
Process Measures			
VAP prevention: Daily application of protocol-driven assessments for ventilation		♦	
VAP prevention: Elevation of the head of the patient's bed		♦	
Influenza vaccination of healthcare workers (new to NHSN for 2008)		♦	

✓ measure found in the National Healthcare Safety Network (NHSN)

[1] Public – Data submitted to the Department of Public Health
[2] BLC – Betsy Leman Center for Patient Safety and Medical Error Reduction
[3] Internal – For reporting hospital's own use only
CVC-BSI – central-venous catheter-associated bloodstream infection
ICU – intensive care unit
SSI – surgical site infection

Appendix 3
CAUSATIVE ORGANISMS IN CVC-BSIs

ADULTS & PEDIATRIC

Etiology	**Criteria 1 BSIs**
Enterococcus species	12
Gram negative organism	12
Yeast	10
Staphylococcus aureus	7 (5 MRSA)
Gram positive and Gram negative organisms	4
Streptococcus species	1
Enterococcus species + coagulase negative staphylococcus	4

Appendix 4
CENTRAL LINE VENOUS CATHETER BLOODSTREAM INFECTIONS (CVC-BSI)
EXTENDED TECHNICAL INFORMATION
INCLUDING PERCENTILES OF DISTRIBUTION OF MASSACHUSETTS INFECTION RATES (7/1/08-10/31/08)

TABLE 4-1
CRITERION 1 CENTRAL LINE BLOODSTREAM INFECTIONS RATES (7/1/08-10/31/08)
WITH MASSACHUSETTS PERCENTILES

ICU TYPE	NO. OF ICUs	NO. OF CVC-BSIs	CENTRAL LINE DAYS	CVC-BSI RATE	MA PERCENTILES*				
					10%	25%	50%	75%	100%
Coronary	12	2	5101	0.4	0.0	0.0	0.0	0.0	1.7
Cardiothoracic	10	4	7427	0.5	0.0	0.0	0.0	0.0	3.3
Medical ICU	15	17	10950	1.6	0.0	0.0	2.9	2.9	3.7
Medical/Surgical	46	9	15702	0.6	0.0	0.0	0.0	0.0	0.9
Surgical and Trauma	20	5	14460	0.3	0.0	0.0	0.0	0.4	1.8
Pediatric	7	5	2784	1.8	0.0	0.0	0.0	2.8	3.0

*A percentile shows the distribution of rates across the entire population. For example, 50% of acute care hospitals included in this report had a rate of 2.9 in Medical ICUs.